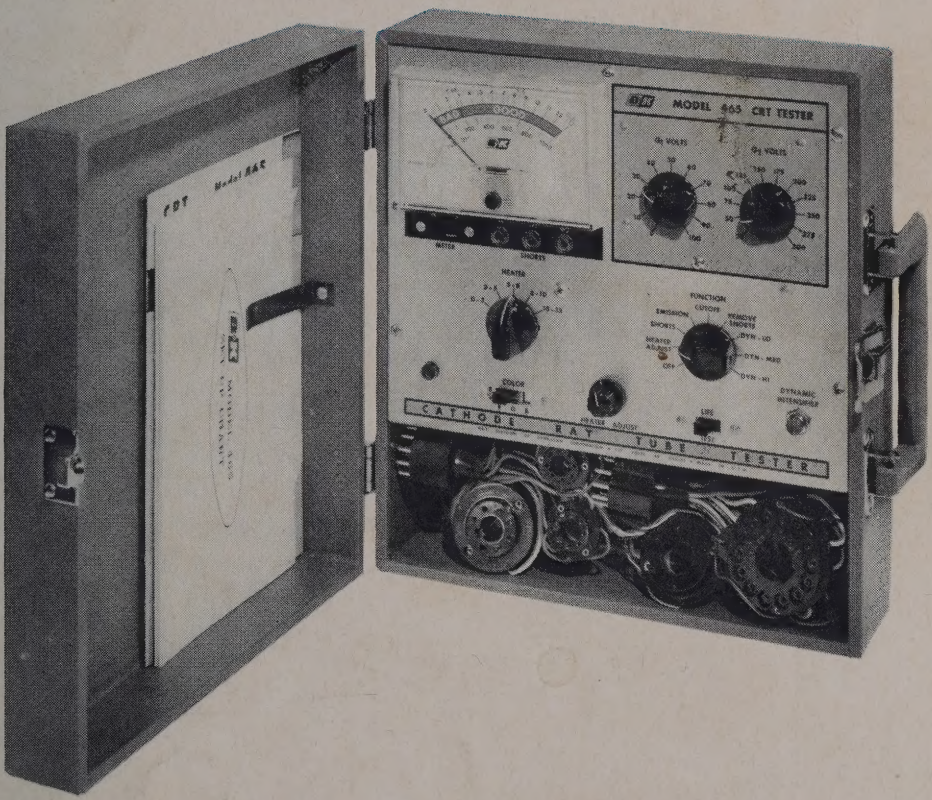
CRT CATHODE RAY TUBE TESTER

B&K

INSTRUCTION MANUAL

MODEL 465



B&K

DIVISION OF DYNASCAN CORPORATION
1801 W. Belle Plaine Ave. Chicago, Illinois 60613

OPERATING INSTRUCTIONS

FOR YOUR

Model 465

CATHODE RAY TUBE TESTER

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B & K DIVISION OF DYNASCAN CORP.
1801 West Belle Plaine Avenue
Chicago, Illinois 60613

GENERAL INFORMATION

This fine quality, easy to use cathode ray tube tester has been designed by B & K to accurately evaluate the condition of virtually any television cathode ray tube.

The Model 465 not only incorporates the essence of its predecessors, but includes many important advances. For example, a continuously variable heater voltage control assures you of precise heater adjustment and effectively protects the instrument from obsolescence by the appearance of new heater voltages in the future. The voltages to grid 1 and grid 2 are also continuously adjustable permitting a tube to be checked under conditions similar to the operation of a tube within a receiver. Abundant storage space, extra large meter, plus functional panel layout, provide you with the utmost of operating convenience. Rejuvenation voltage is available in three separate steps, and it is automatically timed to avoid accidental damage to a tube. Finally, transformer coupling from the line affords you with additional safety. These are several of the reasons we feel you will be proud of your Model 465.

Please note that the operating power is stated on the panel. Do not use this tester on any other type of power.

In order to keep your Set-Up Chart up to date, it is recommended that you subscribe to the B & K Chart mailing service. These mailings will occur in May and in November. New charts will be complete in that they will list all of the tubes presently contained in your chart plus all of the new types of tubes that have come out since the last mailing.

If you wish to take advantage of this service, remit to:

B & K Division of Dynascan Corporation
1801 W. Belle Plaine Ave.
Chicago, Illinois 60613

and you will be placed on the subscription service. No C.O.D.'s please.

WHAT THE MODEL 465
CATHODE RAY TUBE TESTER WILL DO

1. The Model 465 Cathode Ray Tube Tester will test a cathode ray tube for all of the important factors which determine the quality of the tube. The Model 465 will check for shorts or leakage between the elements in the tube (up to several megohms). The Model 465 will also indicate between which tube elements the fault exists.

2. The Model 465 will check for the amount of emission from the cathode of a tube.

3. The Model 465 will check the cutoff characteristics of a tube.

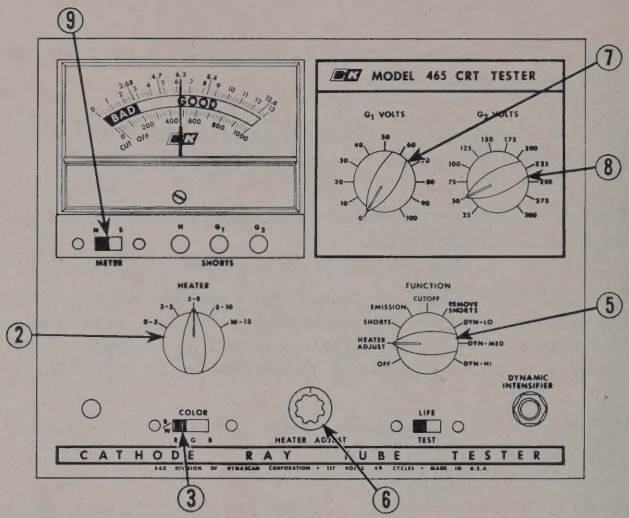
4. The Model 465 will also repair most of the common faults in cathode ray tubes, such as shorts between elements, open connections to elements, and inter-element leakage.

5. The Model 465 will rejuvenate picture tubes which have low emission.

6. The Model 465 will also predict the probable useful life of a picture tube.

7. The Model 465 will perform all of the above tests and repairs on old and new tubes, including the "low G2" tubes that require 50 volts or less of G2 potential and tubes operating at low emission currents.

PREPARING TO TEST



1. Connect the line cord to a power outlet.
2. Set the Heater switch to the proper output voltage range as indicated in the Set-Up Chart for the tube under test.
3. Set the Color switch to the "B/W" position when testing a black and white tube, or the "R" position when testing a color tube.
4. Connect the proper socket to the CRT under test. The "Regular test" socket is the socket at the end of the multiconductor cable. The Black and White adaptor sockets are marked with the letter shown in the Set-Up Chart, and, unless otherwise noted, the color adapter sockets are identified as Large or Small.
5. Rotate the Function Switch from Off to the Heater Adjust position.
6. Rotate the Heater Adjust control until the meter reads the correct heater voltage as indicated on the CRT Set-Up Chart.
7. For both color and black and white tubes, set the G1 Volts control to zero.
8. For a black and white tube, set G2 Volts to the position shown on the Set-Up Chart. For a color tube, set G2 Volts to zero.
9. Set Meter switch to position indicated on the Set-Up Chart.
10. ALLOW THE TUBE TO WARM-UP FOR A MINIMUM OF THREE MINUTES BEFORE PROCEEDING WITH THE SHORTS TEST.

NOTE: As the tests in this instruction manual are performed, the control settings from the previous test should not be changed unless so stated.

For abnormally low line voltage conditions, the correct heater voltage can be obtained by using the next highest step of the Heater switch.

COMMENTS: The figure shows the correct settings of the controls for the following black and white tube on the Set-Up Chart:

TUBE TYPE	HEATER	TEST SOCKET	G-2	G-1 RANGE
21CXP4	6.3	Regular	50	28-50

ATTENTION PURCHASER

YOU HAVE JUST PURCHASED THE FINEST PICTURE TUBE TESTING AND REJUVENATING INSTRUMENT IN THE SERVICE FIELD TODAY. WHEN THIS INSTRUMENT LEFT OUR PLANT THE LATEST TESTING INFORMATION WAS INCLUDED.

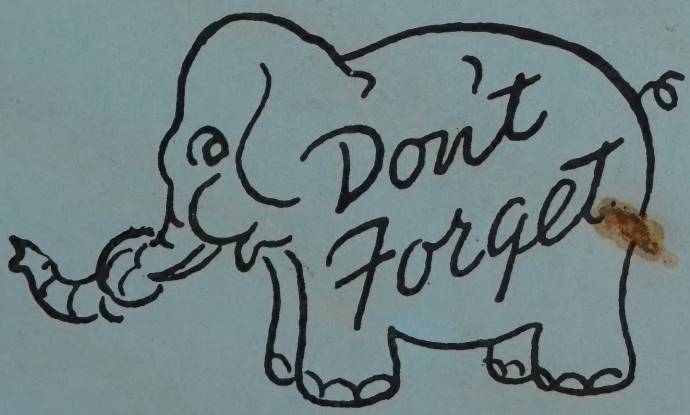
HOWEVER — NEW PICTURE TUBE TYPES ARE ANNOUNCED FREQUENTLY. SO THAT THIS TESTER WILL ALWAYS BE COMPLETELY UP TO DATE OUR ENGINEERING STAFF IS CONSTANTLY PREPARING TEST INFORMATION ON ALL THESE NEW TUBES.

FUTURE INFORMATION IS AVAILABLE TO OWNERS OF B & K INSTRUMENTS, TWICE YEARLY ON OUR CHART SUBSCRIPTION PROGRAM. COMPLETE NEW CHARTS ARE MAILED IN MAY & NOVEMBER.

SEND IN THE ENCLOSED REGISTRATION CARD NOW! IF YOU WANT TO SUBSCRIBE TO THE CONTINUING TWICE A YEAR CHART SERVICE, USE THE ENCLOSED SUBSCRIPTION FORM ENVELOPE IN ADDITION TO MAILING THE REGISTRATION CARD. THE COST OF THIS SUBSCRIPTION SERVICE IS AS FOLLOWS:

Country	Price
U.S.A.	$1.50 per year
CANADA	1.50 per year
MEXICO	1.50 per year
EXPORT	1.75 per year

PLEASE ENCLOSE CHECK OR MONEY ORDER.



DO IT NOW

491-088-9-002B 11-66 RR PRESS

B & K Division of Dynascan Corp., Chicago, Illinois

B&K MODEL TC-70 TUBE ADAPTER

The Model TC-70 Adapter has been designed for use with B&K Tube Testers. This adapter is used for testing some of the more popular Hi-Voltage rectifiers used in the newer models of color television receivers.

Plug the adapter in the designated socket for the B&K Model Tube Tester indicated in the following chart -

B&K Model 700 Tube Tester:

TUBE TYPE	HEATER	SOCKET	SENSITIVITY GOOD - BAD
1AD2	1	32	93
2AH2	2	32	55
2AS2	2	32	56
3AT2	3	32	36

B&K Model 600 & 606 Tube Tester:

TUBE TYPE	HEATER	SOCKET	A	B	C
1AD2	1	3	*99	5	10
*Tube good if it reads 15 or more.					
2AH2	2	3	*99	5	10
*Tube good if it reads 40 or more.					

Complete listings available on the latest chart for your B&K Tube Tester.

MODEL 465 PACKING LIST

_____ 1 ea. Model 465 CRT Tester

_____ 1 ea. Instruction Manual

_____ 1 ea. Schematic and Parts List

_____ 1 ea. Warranty Card

_____ 1 ea. Shipping Damage Notice

_____ 1 ea. Blue Letter to Purchaser

_____ 1 ea. Subscription Envelope

_____ 1 ea. CRT Tube Chart

_____ 1 ea. Black and White Adapter Assembly

_____ 1 ea. Color Adapter Assembly

491-082-9-001 B 9-66

B & K MODEL 465 PARTS AND PRICE LIST

CAPACITORS

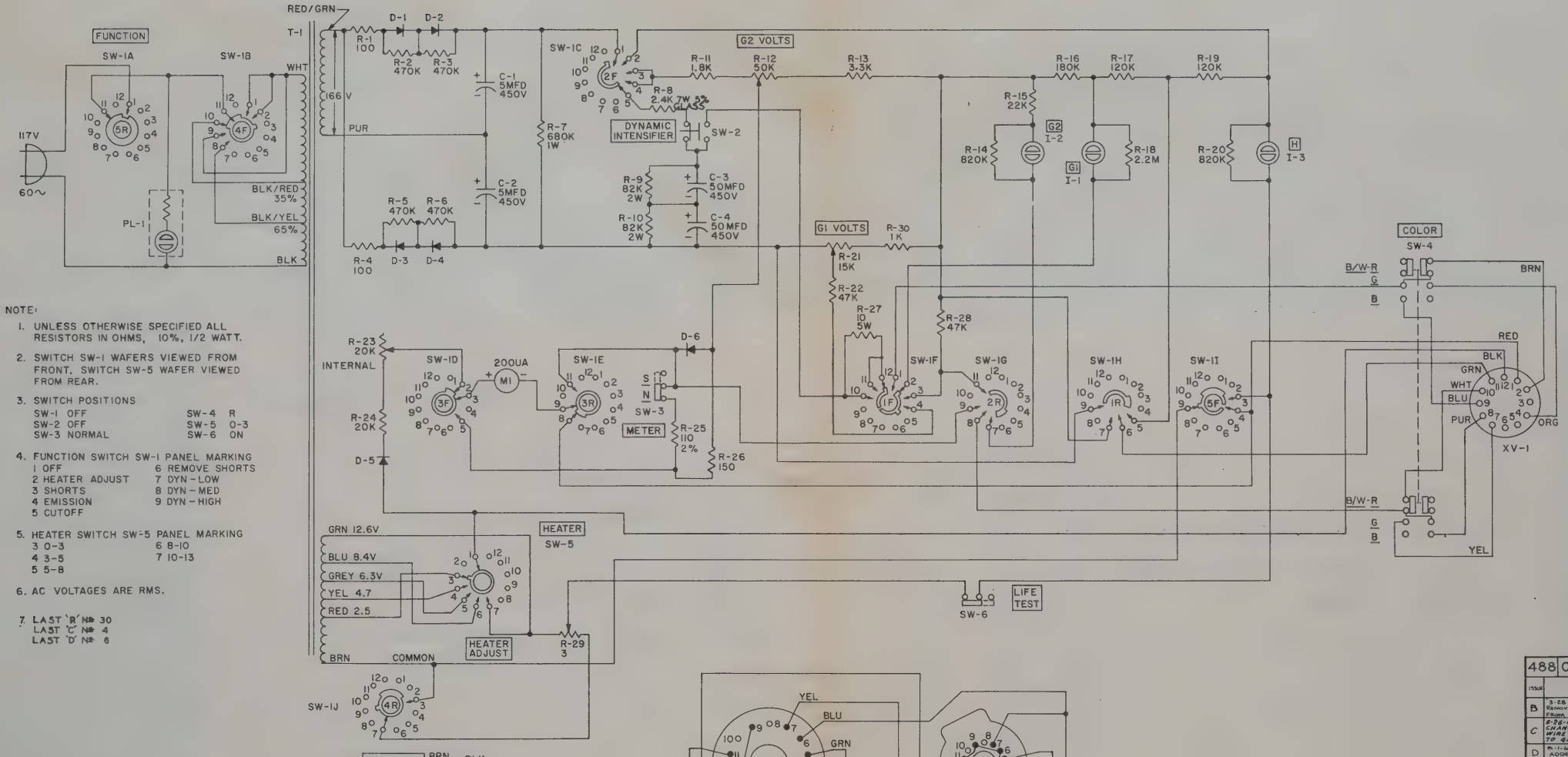
SCHEMATIC SYMBOL	DESCRIPTION	B & K PART No.	DEALER'S NET
C-1} C-2}	5 MFD @ 450V Tubular Electrolytic	021-006-9-001	each .63
C-3} C-4}	50 MFD @ 450V Tubular Electrolytic	021-003-9-006	each 1.32

CONTROLS & RESISTORS

R-8	2.4K Ohm 7 watt 5% glass Resistor	003-007-5-242	.52
R-12	50K Ohm Carbon Potentiometer	008-001-9-023	1.89
R-21	15K Ohm Wire-Wound Potentiometer	009-001-9-004	1.08
R-23	20K Ohm Trim Potentiometer	008-056-9-003	.33
R-25	110 Ohm 2% ½W Metal Film Resistor	011-102-4-111	.30
R-29	3 Ohm Wire-Wound Potentiometer	009-016-9-001	2.94

SWITCHES

SW-1	Function Switch, 10 Pole, 10 Position	083-060-9-001	4.02
SW-2	Dynamic Intensifier Switch, SPDT	088-002-9-001	1.22
SW-3	Meter Switch, SPDT	084-001-9-001	1.47
SW-4	Color Switch, 4PTT	084-001-9-008	.60
SW-5	Heater Switch, 1 Pole, 5 Position	083-061-9-001	1.23
SW-6	Life Test Switch, SPDT	091-003-9-001	.25



NOTE:

1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS IN OHMS, 10%, 1/2 WATT.
2. SWITCH SW-1 WAFERS VIEWED FROM FRONT. SWITCH SW-5 WAFER VIEWED FROM REAR.
3. SWITCH POSITIONS

SW-1 OFF	SW-4 R
SW-2 OFF	SW-5 0-3
SW-3 NORMAL	SW-6 ON

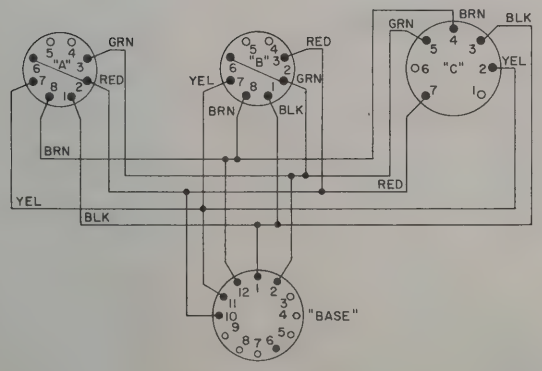
4. FUNCTION SWITCH SW-1 PANEL MARKING

1 OFF	6 REMOVE SHORTS
2 HEATER ADJUST	7 DYN - LOW
3 SHORTS	8 DYN - MED
4 EMISSION	9 DYN - HIGH
5 CUTOFF	

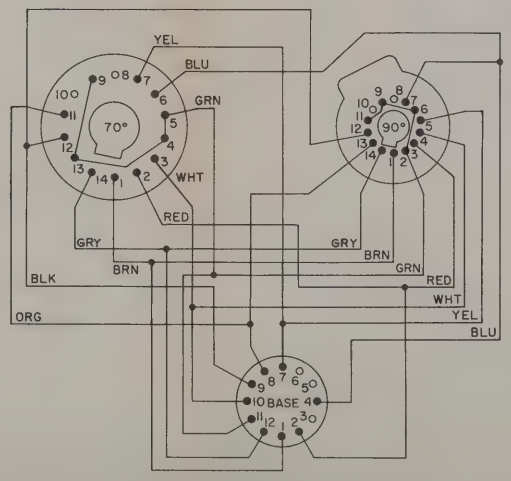
5. HEATER SWITCH SW-5 PANEL MARKING

3 0-3	6 8-10
4 3-5	7 10-13
5 5-8	

6. AC VOLTAGES ARE RMS.
7. LAST 'R' NO. 30
   LAST 'C' NO. 4
   LAST 'D' NO. 6



ADAPTER TO XV-1



ADAPTER TO XV-1

488	053	9	001	
ISSUE	CHANGES			BY CHK'D
B	3-28-66 #1083 REMOVED JUMPERS FROM XV-1 ADAPTER			R.S.
C	8-26-66 #1780 CHANGED PIN No. 12 WIRE FROM PURPLE TO GRAY.			R.S.
D	8-1-66 #1861 ADDED NOTE 7 AND R-30			RW
E	10-25-66 #1870 CHANGED C-3 FROM CARBON TO GLASS			RW

MODEL 465
CRT TESTER
488-053-9-001

MISCELLANEOUS

SCHEMATIC SYMBOL	DESCRIPTION	B & K PART No.	DEALER'S NET
D-1, D-2, D-3, D-4, D-6	Silicon Diode 500 PIV 500 Ma.	112-501-0-501	each .66
D-5	Germanium Diode 20 PIV 10 Ma.	150-001-9-006	.14
M-1	Meter	320-010-9-002	11.85
T-1	Transformer	065-040-9-001	5.91
I-1 I-2 I-3	Shorts Indicator, NE-2 Neon Lamp	401-002-9-003	each .20
PL-1	Pilot Lamp	401-001-9-002	.18
	Case and Lid	270-006-9-001	9.21
	Line Cord	420-001-9-007	.42
	Knob, Heater Adjust	751-002-9-003	.27
	Knob	751-010-9-001	.16
	Red Lens with Tinnerman Nut for Pilot Light	750-003-9-001	.09
	White Lens with Tinnerman Nut for Shorts Light	750-003-9-002	.11
	Cable Assembly, 9 Conductor	522-032-9-001	2.80
	Black and White Adapter Assembly	521-051-9-001	5.55
	Color Adapter Assembly	521-052-9-001	6.45
	Carton and Fillers (503-017-9-001)	500-119-9-001	1.00
	Instruction Manual	480-071-9-001	1.00

(Prices subject to change without notice)

Specify serial number when ordering replacement parts.

Minimum charge $1.00 per invoice. Orders will be shipped C.O.D. unless previous open account arrangements have been made or remittance accompanies order. Advance remittance must cover postage or express.

SHORTS TEST

1. Set the Function Switch to the Shorts position.
2. Interpret the Shorts lights using the table shown below. This table is also shown in the Set-Up Chart.

	H	G1	G2	
	○	○	○	Good
Key:	●	○	○	Bad (H to K Short)
● = on.	●	●	○	Bad (H to G1 Short)
○ = off.	●	○	●	Bad (H to G2 Short)
	○	●	○	Bad (K to G1 Short)
	○	●	●	Bad (G1 to G2 Short)
	○	○	●	Bad (K to G2 Short)

3. When testing a Color tube, repeat the above for each position of the Color Switch, R, G and B.
4. If the tube shows no shorts, go on to the Emission test. If there is a short in the CRT refer to a later section on Removing Shorts, page 10.

COMMENTS: Tap the tube lightly while making the shorts test. It is possible that one or more of the shorts lights will flicker indicating an intermittent connection within the tube.

A short can be distinguished from leakage by the relative brightness of the neon lamp. A faint light indicates leakage while a bright light indicates a direct short.

Leakage can be caused by dust accumulation at the base pins of the CRT socket. Cleaning the tube base with a nontoxic, nonconductive solvent, such as methyl alcohol, will frequently eliminate this problem.

EMISSION TEST FOR COLOR TUBES

1. Set the Function Switch to Cut Off position.

2. Set the Color Switch to the "R" position to test the Red gun.

3. Adjust G1 Volts to the value shown on the Set-Up Chart.

4. Slowly rotate G2 Volts from zero until the meter pointer rests over the Cut Off mark on the dial. If you do not reach the Cut Off mark, the tube is weak and should be rejected.

5. Set the Function Switch to the Emission position and read emission on the dial.

6. If the meter reads in the Bad area, reject the tube. If the meter reads in the Good area, record the reading.

7. Repeat the above procedure for the green and blue guns.

8. If the highest gun reading is no more than 1½ times the lowest reading, the tube is good. For example: The red gun reads 600

   The green gun reads 750

   The blue gun reads 800

   1½ times the lowest reading is $600 \times 1\frac{1}{2} = 900$

   Therefore, since the highest reading, 800, is less than 900, the tube is good.

COMMENTS: If the customer complaint concerns a variation in the black and white picture while the receiver is warming up, refer to the supplemental test on page 11.

EMISSION TEST FOR BLACK AND WHITE TUBES

1. Set the Function Switch to the Emission position.

2. If the meter reading is in the Good area, go on to Step 3. If the meter reading is in the Bad area, refer to a later section on Restoring Emission, page 10.

3. Set the Function Switch to the Cut Off position.

4. Slowly rotate G1 Volts from zero until the meter pointer rests over the Cut Off mark. Do not rotate G1 Volts Control any further.

5. If the G1 Volts setting is within the range given in the Set-Up Chart, the tube is satisfactory. If the G1 Volts setting is not within the range given in the Set-Up Chart, the tube should be rejected because the contrast range of a cathode ray tube is directly related to the cutoff characteristic. The lower the bias voltage needed to cut off the tube, the greater will be the contrast of the picture on that tube.

COMMENTS: A zero reading when the Function Switch is in the Emission position indicates an open G2 or K element. A reading in the Cut Off position that does not change as the G1 Volts control is varied, indicates an open G1 element.

The G2 Volts control should be set carefully so that erroneuos readings and tube damage may be avoided.

LIFE TEST

1. Set the Function Switch to the Emission position.

2. Slide the Life Test Switch to the right while watching the Emission meter. Note the length of time before the meter starts to fall toward zero.

3. When testing a color tube, repeat step 2 for all three color guns.

4. If the meter pointer momentarily remains fixed or slightly increases and then slowly drops to zero, the tube is acceptable. If the meter reading begins to slump toward zero rapidly, the tube cannot be expected to last much longer.

COMMENTS: In this test, the useful life of a picture tube is approximately predicted by the mass of emitting material that is on the cathode of the picture tube and also by the amount of gas present in the tube. When the meter reading falls rapidly to zero, there is probably excess gas in the tube, or there is only a small mass of active emitting surface left. Therefore, the tube cannot be expected to last much longer. (A gassy picture tube cannot be repaired.)

REMOVING SHORTS

1. Set the Function Switch to Remove Shorts position.

2. Wait 5 to 10 minutes so that the CRT tube filament may cool. In this position, filament voltage is not applied to the tube.

3. When repairing a color tube, set the Color Switch to the gun that has the short. For a black and white tube the Color Switch must be in the "B/W" position.

4. Press the Dynamic Intensifier button momentarily.

5. Repeat the Shorts test on page 7 to determine whether the short has been removed. Repeat the Emission test on page 8 or 9 to determine the quality of the tube.

COMMENTS: When the tube in the Shorts test shows a cathode to filament short, do not attempt to repair it. If the tube functions properly in the set, it is unnecessary to do any more to it. However, if the picture is bad (possible hum in picture or no control of brightness), the picture tube can still be used if a 1:1 filament isolation transformer is wired into the set.

RESTORING EMISSION

1. Set the Function Switch to Dyn-Lo (Dynamic Intensifier-Low) position.

2. When repairing a color tube, set the Color Switch to the gun that is to be rejuvenated. For a black and white tube, the Color Switch must be in the "B/W" position.

3. Press the Dynamic Intensifier button momentarily.

4. Repeat the Emission test on either page 8 or 9. If the meter reads in the Good area, you have successfully rejuvenated the tube. If the Emission is still low, place the Function Switch in Dyn-Med position and allow 15 seconds for the heater to come up to operating temperature. Press the Dynamic Intensifier button. If the Emission is still low, repeat this procedure in the Dyn-Hi position.

COMMENTS: Any attempt to bring back the emission by rejuvenating a tube should be done very cautiously, AND ONLY AFTER IT HAS BEEN DEFINITELY DETERMINED THAT THE TUBE IS NO LONGER USEFUL IN ITS PRESENT CONDITION. When rejuvenating a Color tube, make sure you attempt rejuvenation of the defective gun only.

It is not generally advisable that you attempt rejuvenation of an "in-warranty" tube.

SUPPLEMENTAL COLOR TUBE TEST

To determine whether changes in black and white tracking as the receiver warms up is caused by the tube or by the receiver, the following test should be performed.

Allow the tube to cool for 30 minutes. Connect the tube to the Model 465 and perform the Emission Test on page 8 after 2 minutes and after 4 minutes. Record all six readings. For a tube to be acceptable:

1. Readings obtained in the 4 minute test must be in the Good area of the scale, and the highest gun reading should be no more than 1.5 times the lowest reading.

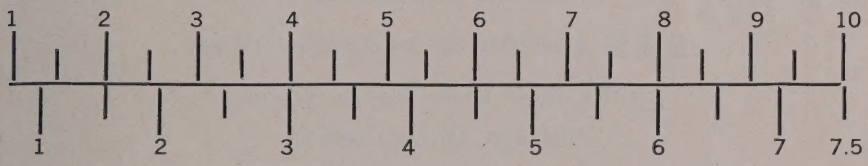
2. The meter reading for each gun in the 2 minute test must be at least 75% of the reading obtained for the same gun in the 4 minute test.

If, for example, the following readings had been obtained:

Gun	*2-Minutes*	*4-Minutes*	*75% of 4 Minute Read.*
Red	500	800	600
Green	700	800	600
Blue	750	850	637

The Green and Blue guns have 2-minute readings greater than 75% of the 4-minute readings and are acceptable. The 2-minute reading of the Red gun, however, is below 75% of the 4-minute reading which indicates slow warm-up of the Red gun.

This chart may be used to obtain 75% of the 4-minute reading.



Locate the 4-minute reading on the top scale. 75% of this reading is found on the bottom scale.

REPAIRING OPEN ELEMENTS

If the tube has an open G1 or G2 element, the probable cause is a bad solder connection at the base pins. For an open element, the first step is to try resoldering the pins on the base of the picture tube. If the tube has an open cathode, it may actually be a break in the weld between the cathode and its connecting tab or very weak emission from the cathode. First try restoring emission, as discussed in a preceeding section. If that does not work, you can attempt to weld the cathode tab as follows:

Turn the Function Selector Switch to Dyn-Hi position. With the non-metallic handle of a screw-driver, tap lightly on the neck of the tube. Watch carefully as you press the Dynamic Intensifier button while tapping. If the weld takes, you will see a bright flash. Retest the tube to be sure it will function satisfactorily.

MAINTENANCE

A control for calibrating the meter for heater voltage is located internally. This control can be set by first placing an accurate voltmeter across pin No. 1 and pin No. 12 of the regular socket and then, with the Function Switch in Heater Adjust position, by adjusting the Model 465 meter to the reading of the standard voltmeter.

WARRANTY SERVICE INSTRUCTIONS

1. Service information is available from the factory at the address shown below.
2. Defective parts removed from the unit which are within the warranty period should be sent to the factory prepaid with the model and serial numbers of product from which they were removed. Also, include the date your Model 465 was purchased. These parts will be exchanged at no charge.
3. If you are unable to correct a difficulty, pack the product securely (preferably double packed). A detailed list of troubles encountered must be enclosed as well as your name and address. Forward prepaid (express preferred) to the nearest B & K authorized service agency.

Contact your local B & K Distributor for the name and location of your nearest service agency, or write to

Service Department

B & K DIVISION OF DYNASCAN CORP.

1801 West Belle Plaine Avenue

Chicago, Illinois 60613

WARRANTY

"B & K warrants that each product manufactured by it will be free from defects in material and workmanship under normal usage and service for a period of ninety days after its purchase new from an authorized B & K distributor. Our obligation under this warranty is limited to repairing, or replacing any product or component which we are satisfied does not conform with the foregoing warranty and which is returned to our factory or our authorized service contractor, transportation prepaid, and we shall not otherwise be liable for any damages, consequential or otherwise. *The foregoing warranty is exclusive and in lieu of all other warranties (including any warranty of merchantability), whether express or implied.* Such warranty shall not apply to any product or component (i) repaired or altered by anyone other than B & K or its authorized service contractor (except normal tube replacement) without B & K's prior written approval; (ii) tampered with or altered in any way or subjected to misuse, negligence or accident; (iii) which has the serial number altered, defaced or removed; or (iv) which has been improperly connected, installed or adjusted otherwise than in accordance with B & K's instructions. B & K reserves the right to discontinue any model at any time or change specifications or design without notice and without incurring any obligation. *The warranty shall be void and there shall be no warranty of any product or component if a B & K warranty registration card is not properly completed and postmarked to the B & K factory within five days after the purchase of the product new from an authorized B & K distributor."*

B & K *DIVISION OF DYNASCAN CORPORATION*

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